Review of the book: Michael Ruse, The Gaïa hypothesis: science on a pagan planet

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Review of: MICHAEL RUSE, *The Gaia Hypothesis, Science on a Pagan Planet*, Chicago: University of Chicago press, 2013, 272 pp, $26.00 (e-book version: $18.00).

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Philosophers of biology, along with evolutionary biologists, have tended to dismiss the Gaïa hypothesis since its inception, and quite promptly so. An entire book on the Gaia hypothesis written by a prominent and pioneering figure of (history and) philosophy of biology since the early 1970's, and who is a convinced Darwinist, Michael Ruse, is thus more than welcome. I was curious to read the book and took pleasure and interest in it.

Ruse's intimate knowledge of the actors involved in evolutionary biology as well as the numerous interviews on which the book relies on contribute to the delivery of a particularly rich and vivid book. However, the target of the book is not the content of the Gaïa hypothesis itself but rather its *reception*, a move that allows Ruse to make more general points regarding the overall dynamic of science.

The first two chapters lay down the groundwork for the central question of the book: why was the Gaïa hypothesis so violently rejected by professional scientists and so warmly welcomed by the public opinion?

The next four chapters look far before Gaia. The first one deals with "living" conceptions of the "world" going from Plato to Schelling. Three intellectual frameworks, pervasive since the XIXth century, are then distinguished for the purpose of understanding Gaïa in historical context:

a. Mechanism – Ruse retains two attributes (constancy of laws, the world is machine-like) and link them to biologists and geologists (Hutton, Lyell, Darwin);

b. Organicism – used somewhat exchangeably with holism or emergentism: under this label, Ruse captures a history going from Spencer to Wright through Henderson and Allee;
c. Hylozoism – Ruse discusses under this concept the ideas of Steiner, ecological philosophies (Thoreau, Leopold, Carson, Naess) and neo-pagans. Dealing with the idea that the world is living, this chapter seemed to me the most original and colourful of the four devoted to broad historical questions. Indeed, scientific critiques of the Gaïa hypothesis have often conjured up New Age movements as a scarecrow which should repel us from the Gaïa hypothesis: with such a detailed presentation of neo-pagans ideas, and Gaia's reception therein, Ruse makes a decisive contribution.

The role played by these four chapters seems to be, firstly, to show that the public opinion has already been in contact with romantic or organic conceptions of the "world", and was thus prepared for accepting Gaïa; secondly, these chapters underlie the existence of a persistent and lively organicist tradition in (the life) sciences that under various (sometimes radically distinct) modes consistently opposed mechanist views ever since the Scientific Revolution.

The other major contribution of the book consists in dismantling three intellectual traditions within the Gaia-sphere: Lovelock is the mechanist; Margulis is the organicist; and the neo-pagans are the hylozoists. To support this very stimulating interpretation that contrasts Lovelock as a mechanist with the co-author of the Gaïa hypothesis (Margulis) and with other supporters of Gaïa, Ruse offers several good arguments: the career of Lovelock as engineer and great inventor of exquisitely sensitive *machines*; Lovelock as fellow of the conservative royal society; and finally, his way of arguing through a mathematical and computational model (Daisyworld) - something Margulis would never have considered. However, besides the verbal claims about emergence and holism early made by Lovelock alone (in the 1972 letter to *Atmospheric environment*, "Gaïa as seen through the atmosphere", and constantly since), two elements do not fit in this picture and are not mentioned in the book. An important brand of mechanism – the one to which Ruse refers to here – contends that there is no strong division between physical and biological

phenomena. But since its first formulation, the very core of *Lovelock*'s version of the Gaïa hypothesis has always relied on a very strong *distinction* between biotic and abiotic phenomena, as magnified in the early comparison of Mars, Venus and Earth's atmospheres, and as exemplified later in the Daisyworld models intended to compare biotic and abiotic scenarios (Dutreuil, "What good are abstract and what-if models? Lessons from the Gaïa hypothesis", this volume). Moreover, this thesis – about Lovelock as a traditional mechanist –, as grounded and stimulating as it is, still fails to take into account the strong (and very constant since 1972) appeal of Lovelock himself to what he calls an alternative conception of *nature.*

In the penultimate chapter, Ruse examines the reception of Gaïa by "professional scientists". He recalls that back in the 1970's and 1980's, professional science was "under attack" from several sides (Foucaldian ideas, feminist movements, environmentalists). Evolutionary biology, in particular, was in an insecure institutional position due to internal debates about altruism, external pressures from evangelical Christians, loss of weight within academic biology at the expense of molecular biology (and one may add on the top or Ruse's arguments, at the expense of NASA space and exobiology programs from which Lovelock and Margulis precisely both came from**).** Leaving aside epistemological issues, Ruse argues that these sociological factors contribute to explain one specific property of the reception of Gaïa by "professional scientists", namely the "nastiness" of the critiques (pp. 32 & 203).

Ruse's discussion of Gaïa's reception by "professional scientists" is very well documented and offers the reader an interesting and informed view about Gaïa's history, to the extent that "professional scientists" refer to *evolutionary biologists*. Yet it ignores the fact that evolutionary biologists' discussions about Gaïa have not only been sometimes "nasty", they have also been very *prompt*: at most few pages per author in this literature.

The reason for this, I would suggest, is that evolutionary biologists simply did not care about the hypothesis. This occurred in part because of the cybernetic framework from which Lovelock presented his hypothesis (begging the question of whether it was pertinent to interpret, as it has often been, "homeostasis" as an "evolutionary adaptation"), but mostly because the Gaïa hypothesis deals with objects

and questions evolutionary biologists have never really been interested in: habitability of planets, long-term history of the atmosphere and climate, erosion of mountains and rocks, global biogeochemical cycles and the role of life therein.

On the other hand, the "professional scientists", be they enthusiasts or severe critics of the Gaïa hypothesis, who discussed in details the objects and mechanisms Lovelock and Margulis brought to the fore, the ones who attended the Chapman Conferences dedicated to Gaïa and wrote entire books about the hypothesis, no matter the stance (very critical, cold and neutral analysis, or praiseful), were mostly geochemists, geologists, atmosphere physicists and chemists, climatologists, oceanographers, modellers from Earth sciences, paleontologists, Earth historians, global ecologists. This is another story, different from the one Ruse intended to address in this book: it concerns the impact of the Gaïa hypothesis on contemporary disciplines located at the interface of geology and biology (geobiology, Earth System Science) and its "reception" therein which generated a literature much more abundant than in evolutionary biology. Uncovering this other story means engaging in something yet to come that would be a philosophy of Earth sciences. One of the merits of Ruse's book is also, by indicating that the Gaïa hypothesis and its story are richer and more interesting than what the usual critiques by philosophers of biology have assumed, to indicate there is room for many other, different approaches of the topic, coming from various other perspectives.

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